

A TRIBUTE TO GEORGE W. GODDARD

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Brigadier General George Goddard (USAF, R.) was honored at a luncheon on 10 August 1961 during the Sixth Annual Technical Symposium of the Society of Photographic Instrumentation Engineers. I was invited to give the luncheon address.

Reconnaissance grew from infant to heavyweight during Goddard's career and is getting more depersonalized and spiral bound daily. It is now a big time, cool subject; I hope that we can find modern equivalents of Goddard. We had better.

The remarks which follow were largely ex tempore, and will be evident. They have been slightly edited, but no substantive changes were made. I thought it better to preserve the flavor of the occasion, than to polish the prose into something I didn't say.

The current interest and appreciation of reconnaissance and photography (may it never decrease!) caused me to disinter the 1961 tape and cause it to be transcribed.

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Many of you have heard me talk before. I have talked from many platforms and have always enjoyed myself, but I can honestly say that never have I looked forward with as much anticipation and pleasure to any speech as I have looked forward to this occasion.

This is an honor and pleasure for me, but in addition, a very difficult task. I started collecting notes sometime ago, and I found (not at all to my surprise) that I was not only writing the story of George Goddard, but a history of the world during the last twenty or thirty years as seen through the special eyes of reconnaissance. My collection of biographical material, anecdotes, incidents, names, places, events, excitements about George Goddard is huge -- but somehow this all turned out very flat when I tried to put it together.

Now there is a very simple reason for this. My job here is to try to integrate, to sum up this man, his work, estimate his impact, and to tell you something about what he has done during his long career. I find when you write this down, it really consists of a large number of dates, essentially stark and sterile facts. Instead, what we have been confronted with has been a giant rocket roaring through space; the trick is to plot the trajectory, note the sights enroute and thus attempt to give a semblance of a mathematical model, of order, of regularity, of steady unimpaired progress.

Of course, trying to plot George Goddard in a coordinate system requires more dimensions than are commonly available. I could talk for hours just about George Goddard as a personality and as a character, but more hours would be required to tell about him as a military man, as a laboratory chief, as a goad, a tormentor, a

photographer, and a developer -- not only of films and ideas and equipment, but of people. And, of course, I could talk of him at length as a friend. But this adds up to too many dimensions and too much time.

Another path I could have taken -- and as you will see in a moment, I sampled a little from each of these coordinates -- is to select from the twenty or thirty thousand circulated anecdotes about Goddard, a few which would illustrate the essence of the man. When I said there were twenty or thirty thousand known anecdotes about Goddard, I really meant twenty or thirty thousand which are repeatable.

This account is, for better or worse, a personal view. Because it is a personal view, I might begin by saying how I got to know Goddard. I went to work for him in 1940. (How that happened is a separate story, and it all links with a foul-up on civil service registers, examinations, etc., etc., but it bears no relationship to this thread, so we will pull that thread and drop it.)

The first Air Corps officer I ever met in my life, I met at Wright Field. Then working for Major Goddard, he was Major C. P. Cabell, and he is now a four-star Air Force General and deputy to Allen Dulles in the CIA.\* Also working for George Goddard at that time was a young and bright 2nd lieutenant with whom I subsequently took my first airplane ride. His name was W. A. Davis, and he is now a major general and commands whatever Wright Field happens to be called these days.\*\* (I find it difficult enough to keep up with advances

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\*Since retired.

\*\*Now at USAF's Ballistics Systems Division.

in technology, and I have just about given up the problem of keeping up with advances in nomenclature and changes in organizational designations.)

All of this produces a bouillabaisse, a mixture, a chemical compound, a really impossible story to tell consecutively and coherently, and certainly impossible to tell correctly.

I am reminded, of course, of Khrushchev's famous speech in which he denounced the cult of personality. He was referring to the late, and by now largely unlamented Joe Stalin, not to George W. Goddard. The story of George Goddard, and his ambles through the fields of technology and finance, through the military and through the Air Force is really the story of a very strong personality thrusting the way through and forging a new path.

From George Goddard I learned a number of very important lessons, not the least of which are those on how to cope with bureaucracy. I cannot afford to share all these lessons with you because I make a living out of practicing what I have learned from some of them. I choose to call the first lesson I learned the "failure of the reciprocity law." We are all familiar with the reciprocity law in photography, and many of us are familiar with the failure of the reciprocity law in photography. This law was reformulated operationally by George Goddard, and applied to bureaucracy. I don't know that Goddard ever heard my formulation before, but he certainly has been practicing it. It is simply this: A full-time push by one man in a given direction greatly exceeds in efficiency part-time opposition by many men.

Years ago Goddard found that a continuous full-time push would eventually, if not often, catch everybody out to lunch at the right time and the papers would sail through and get coordinated.

I remember George Goddard carrying Wright Field budgets through many lean years by means of aerial photographs. Now there were a lot of things that were more exciting in the old days than photography--variable pitch propellers, jet engines, radar, things that move, etc., etc., but somehow George had the knack of putting the budget over by means of a peculiarly appropriate photograph or photographic illustration.

This reminds me of an open house held at Wright Field shortly after the war (World War II, that is). Several of the big hangars on the flight line were filled with exhibits by the various laboratories. The radar people had things that were moving, antennas that were rotative, wobbling, spiraling, the engine people had cut-away engines working, the propeller lab had interesting exhibits (those were really the old days; there still were propellers), navigation equipment was on display; all in all it was a wondrous look at the technology which had emerged from and helped win World War II. There were even examples of live television; this was especially fascinating because TV was not commercially available nor in widespread use, and television was still interesting.

Our poor photographic laboratory was without very many things that moved. Looking through a magnifying glass at a high resolution photograph, while elegant and fascinating to those who already know, is hardly calculated to lure somebody away from a radar exhibit or

from an exhibit of live television. But here came Goddard. We had recently developed a case to put a camera in. Not a camera, a case to put the camera in. This case was a beautiful job, indestructible, waterproof, fungus-proof, moisture-proof, break-proof, etc., etc.

In an effort to capture some of the vast crowd busy milling around the other exhibits for his own photographic exhibit, Goddard simply took half of this case (which was the size of a large suitcase or camp trunk), stood up on a table and threw it down on the concrete floor. He kept this up. This noise immediately attracted everyone's attention; the combination of the vast hangar, concrete floor, the heavy case, gave one the impression of being inside a large bass drum. With this strategem, Goddard got everyone to leave the other exhibits and come to visit our exhibit. And, of course, they found "goodies" waiting for them.

It was Tom Marshall, Vice-president under Woodrow Wilson, who first said, "What this country needs is a good five-cent cigar". I remember Goddard stumping the country for years on end with his equivalent of the Marshall aphorism, "What this country needs is a good 9 x 18 photograph." And indeed, long after we got many good 9 x 18 photographs, Goddard kept changing it to read, "What this country needs are better 9 x 18 photos."

The next point on the curve stems from a bit of history which I am sure George has forgotten. As everyone knows, or ought to, I have been interested in reconnaissance for many years; my files are full of esoterica related to this business, many unique in the history of reconnaissance.

Of course, reconnaissance, in order to pass as a civilized subject, should have a literary tradition and a method of finding out what happened in the past. There is, unfortunately, no place in the United States that I know, where what has been done and what happened is systematically reported and collected for serious students of this important subject. My files pass for a highly ineffective and unsatisfactory substitute for what we really ought to have. I have taken this task unto myself and any of you who have been to my office or who will be there in the future, will find evidence of what I have just said. One of the items in this collection is a historical account of the development of reconnaissance aircraft and aerial photographic equipment covering the period 1915 to 1945.

Some time ago, I had occasion to prepare some informal notes on one of the items in that book; and I titled this particular section, "On Censorship and Free Speech". You will shortly see the relevance of this title to this subject. Let me quote from those notes:

"My erstwhile boss at Wright Field, now retired, was Brigadier General George W. Goddard whose activities in reconnaissance were often controversial and about whom opinion is highly polarized."

There are those at hand who occasionally muse about the 'good old days'. For those let me dip into the historical accounts mentioned above. It was 1925, and no one had yet heard of megabucks" [let me insert into the reading of these notes, to bring everyone up to speed, my definition of a 'weapon system': A weapon system is something that at least costs a hundred million dollars to cancel.]

In this reference, the historical account, we find:

"The matter of funds for aerial photography was a problem to be contended with yearly. The trend seemed to be toward less money the more remote the wartime period became, and disparity between what the Aerial Photographic Branch asked for in the way of funds and what it actually received became wider and wider. For example, in February 1925 Lieutenant George Goddard suggested to his chief that instead of the \$31,000 available in the current fiscal year he needed \$100,000 at a minimum. He defended the Engineering Division's request for funds still further in reply to a statement made in Congress:

"We have not scratched the surface yet in aerial photographic development. Recently Congressman Madden made a wild statement, claiming the Engineering Division had not developed a thing and had wasted lots of money. Believe me, he is sadly misinformed, for every day very valuable developments are made at this Division which benefit aviation in general, both from a military and commercial standpoint."\*

This historical account includes as well a long list of projects under consideration for the year 1925. Applying the usual discounts to all such accounts, whether proffered by friends or foes, there were still one hell-of-a-lot of items left to be developed, work to be done, tests to be made, etc., etc.

Two things in this account are amazing. First, that a lieutenant (by the way, who has seen one lately?) would dare talk back publicly to a Congressman, and second, what one could think of getting for a buck. Let me pluck the strings of my favorite harp once again: recourse to history for a guide to the future is not always profitable and not always useful, but ignoring history completely is stupid, and may force one to repeat history.

Now if we go around the country asking people: "How do you remember George Goddard?" it would turn out that he has been all over

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\* Lt. Goddard to New York Times Washington Bureau, 8 December 1925.



and affected and intercepted people all over the country. Most of their images of him will be that as Chief of the Aerial Photo Laboratory at Wright Field. This, I might add, is my image too, as this is the way I got to know him and where I served with him for many years. Of course, I had never regarded that job at Wright Field as other than temporary, so I left after 15 years.

Now before describing what he did as Chief of the Aerial Reconnaissance Lab, (as the name was changed from Aero Photo Laboratory) it is first necessary to describe how there happened to be an Aerial Reconnaissance Lab altogether. In the years preceding World War II and, in fact, before I arrived at Wright Field, what later turned out to be the Photo Lab., was nothing but a small branch of the Equipment Laboratory. By dint of argument, persuasion, force, concentration, one-track activity, fanaticism -- and all the other characteristics of conviction -- then after much exacerbation on the part of those being exacerbated by Goddard's tactics, we got an Aerial Reconnaissance Laboratory.

I first met George Goddard in a peculiar way. This happened a few months after I joined his laboratory, and in the process, I discovered another one of his solutions to the problems posed by the existence of a bureaucracy. He had a simple principle: Anyone out in the hall wasn't working, and therefore was available for work. So it was that when he needed something to be done in a hurry, he walked out and the first guy he found out in the hall got the job.

One day in early 1941, I heard a voice calling: "Hey you!" This is how I generally was addressed in those days, so I knew the

request was directed toward me. It was Goddard; he said: "Hey, you're one of those scientists, aren't you?" I said: "Yes, sir." He went on to say: "As you know, we are getting a lot of blankety-blank amateurs into this reconnaissance business, and they all think they can go upstairs with a little old Leica, take beautiful pictures, make enlargements and see as much as you can with a big camera. Now you and I know it ain't so, and I want you to prove it scientifically." Of course, this confirms an old adage that when you are about to do an objective and scientific piece of investigation of a topic it is well to have the answer firmly in hand, so you can proceed forthrightly, without being deflected or swayed, directly to the goal.

He said: "I want you to prove this mathematically and scientifically," which I took to mean, "I need something to get these doggone amateurs off my back."

I did it, and this was my first job directly for George Goddard.

Now he was mildly suspicious of physicists to begin with until he found that some of them at least, were willing to get out and fly and take pictures themselves, and others, like Duncan MacDonald sitting here, were willing to spend many sunburned hours out painting resolution targets on huge patches of concrete. Of course it's getting harder and harder to find that kind. Now the idea of being a scientist is to be on a committee and go to lots of meetings. In those days Goddard really insisted that they fly, that they take cameras apart, that they get all kinds of experience, do all the photography they wanted, use all the resources to learn the fundamentals of the business upon which they could then theorize. And, of course,

now we talk about generalized cameras, write reports about them and instead of handling equipment we handle reports. Thus, Goddard raised a whole generation of people who had the ennobling experience and opportunity of ranging across all aspects of aerial photography from focusing the cameras, testing them in the laboratory, installing them, flying them, processing the pictures, analyzing the pictures, making scientific tests, going overseas, visiting the consumer, etc., etc. As a result, many of us had truly marvelous experiences. Come to think of it, there was the entirely other matter that at the time we didn't think these experiences we were having were very marvelous or ennobling. It turns out in retrospect that Goddard was right and we were wrong.

In retrospect, the most remarkable thing about Goddard, to my mind, is the almost uncanny way he had of making bets on people. This ability was unerring. I have often talked with the people involved with Goddard, and with Goddard himself, to try to establish a rational basis for the way he made his bets. I have not yet found a way of reducing his practice to words. One of the best examples of the way in which he had of sponsoring "longhair research" occurred early in 1941, when George Goddard got together with Dr. James Baker of Harvard. Those two highly dissimilar men got together and laid a program of developing lenses which almost everybody else thought, with reason, was impossible of fulfillment. There was no rational basis at that time for Goddard's belief that it was possible to lay out a lens design of the quality and type that was then laid down, nor was there any basis, except recognition of genius, to believe

Baker could do what he promised. But he did. The establishment of Baker's laboratory at Harvard University which, after World War II became the basis for the Boston University Physical Research Laboratory under Duncan MacDonald.

Another important effort was Goddard's work in starting what became the biggest electronic flash unit that was ever made, getting Doc Edgerton into the act, and literally going from a flash-in-the-pan to an eye-in-the-sky. This is all part of the image I have of him as Chief of the Laboratory. It is impossible to tell you all of the things he did; some of them we are not necessarily as proud of today as we were then. Many of the things we did went off at right angles to the main stream; but when it was all over there was a net vector of considerable dimension in a forward direction.

All of the stories about George that I have collected and that I have heard really illustrate a kind of devotion and kind of single-mindedness, fanaticism if you will, all devoted to the single subject of aerial photography, a high purpose with ultimate pay-off. Not only was high purpose shown, but what was much more important, high thrust accompanied his purpose.

One of my favorite stories occurred in the pre-World War II era, about 1937 or so. The F-2 aircraft, the Beechcraft, had just come to Wright Field and was at that time the hottest airplane around; and, of course, everyone was dying to fly it. Remember that the standard photo airplane available at that time was the high wing Fairchild C-3. One day George was sitting in his office and a lieutenant came in. "Major Goddard," he said, "I want to get married. Will you kindly

sign this little piece of paper?" (Apparently in those days one had to get permission from the commanding officer in order to get married: America has since become free.) Without looking up from his desk or taking his cigar out of his mouth, Goddard signed this piece of paper.

A few weeks later Goddard called this lieutenant in to his office and said: "Son, I'll tell you what we're gonna do. You're gonna take the C-3 airplane to New York, we're gonna take some pictures and then come back, and you're gonna do it in the next couple of days." The lieutenant almost dropped dead and said: "Why Major Goddard, sir, I can't do that. I'm getting married. You ought to know." Goddard says: "How come I didn't hear about that?" The lieutenant replied: "Why Major Goddard, sir, you signed the piece of paper. Here it is." So Goddard looked at the paper, looked at the lieutenant, and thought a while. He said: "I'll tell you what. You get married, send your bride to New York on a train, you fly the C-3 to New York and do the job." The lieutenant said, "Why sir," he says, "I can't do that. This is a hell of a way to get started on married life." Goddard thought about this objection for a while, paused a moment, drew on his cigar a couple of times, and said: "All right, son, I'll tell you what. I'll let you fly the F-2."

One aspect of my work at Wright Field was what I laughingly call "Fighting the Parameters and Constraints." Goddard always wanted a faster one, a bigger one, a better one, a higher one whatever it was, even if it was a more expensive one -- which it always turned out to be. One day, Goddard called me and said: "What do you think of that enlargement?" And there in front of us on an easel

beautifully mounted and lighted, was an enlargement 4 ft. by 8 ft. in size made from a 9" x 18" aerial photograph. By this time I had developed an avid interest in the history of aerial reconnaissance, and had been reading from some old works, so I told him: 'I'll tell you, George, did you know that in 1905, a fellow flew a camera that made 4 ft. x 8 ft. contact size prints on a camera which exceeded in weight the Wright brothers plane including the two Wright brothers?' Now I am sure he knew it, but he didn't let on that he did. He didn't want me to know that he knew it. He didn't say another word, but he gave me a very fishy stare. The next thing I knew, we had the world's biggest enlarger and we were busy making enlargements on single sheets of paper 10 ft. by 20 ft., a technical trick which has not been surpassed even today.

I remember many other things about George. I remember coming back from Bikini in 1946, directly after the atom bomb tests. July 1, 1946 was a very wonderful day. A lot of things happened that day; the bomb went off at Bikini, blew the hell out of many ships, caused a huge spectacle; we took many pictures, it was a new fiscal year, there was a change in the per diem regulations which was possibly of even greater importance than anything else to the poor civil servants out there, and among a few other things which I can't tell, George was arrested by the Marines on Kwajalein Island for taking pictures in a forbidden zone. He was unable to demonstrate satisfactorily who he was and that holding a camera was a natural thing for him. He tried to tell it to the Marines, but they wouldn't listen. I remember that when we went to bail him out of the

bastille on Kwajalein Island, we found George there in the company of a couple of bearded Navy men who had deserted a year before and had been picked up on one of the islands of the atoll. We managed to fly back from Bikini together, and on July 4, 1946, Duncan MacDonald, George Goddard and I (and numerous other people) found ourselves over McCook, Kansas, in the middle of a real tornado. George and I were up kibitzing with the pilots when suddenly it got extraordinarily rough and turbulent. I preceded George on my hands and knees crawling back to the security of a seat in the cabin of the C-54, and strapped myself in. Goddard, directly behind me, never got to a seat. I had him by his chest-pack harness for the entire few and horrible minutes that followed. We were lifted from 4,000 feet to 10,000 feet very rapidly then immediately slammed down to 2,000 feet. Coffee cans, life rafts, paraphernalia, foot lockers, cans of film, all kept hurtling from one end of the aircraft to the other. That was another experience which cemented certain bonds between us.

I remember going to Korea on my birthday, August 15, 1950. George had just come back from a quick trip to Korea to see what could be done with reconnaissance there, and a second detachment from our lab was going. I had already said goodbye to the people, was preparing to go home a few minutes early for my birthday party when all of a sudden one of these, "hey, you!" messages came whistling down the hall. He said: "We just got a cable from Tokyo from MacArthur which says he wants you, by name, to go over immediately." Of course, I should have known better. Everything that came out of

the Far East theater was signed by MacArthur. Within eighteen hours from that afternoon, I was shot thoroughly in both arms, processed, and outward bound. (This illustrates another important bureaucratic phenomenon--a massive organization can really move fast when they want you to do something or go somewhere, but when you come back and the pieces have to be picked up, in general you are all by yourself fighting an uphill battle trying to collect per diem, write reports, etc., etc.) Anyway, George assured my wife that this would be the best experience in the world for me. Now my wife, who has a strong will and mind of her own, didn't react to this in the expected way, but simply turning to me said, "Go on," she said, "tell him you're a civilian! Tell him!"

On some of the cards which I subsequently mailed to Goddard from Korea, I mentioned this fact. Preparing for this trip with the short notice I had, I said, "George, How's the weather there? What should I wear?" He said, "It's warm, it's hot, don't even take a sweater. You're going to go by way of Hawaii, it will be wonderful, warm all the way." So we took off, and the very first card I wrote Goddard was from Shemya Island in the Aleutians. While we had a several hour lay-over in Shemya, I took a trip around the island and on the beach (this was long before that novel was written), we found a whale vertebra. Now we had several hours in Shemya; we weren't just going to leave the vertebra where we found it, so we took it along with us aboard our aircraft. We thought that on our way to Japan we would have plenty of time to figure out some interesting use for this whale vertebra which, as I now recall,



was about 18 or 20 inches in diameter and about foot or more thick. Finally, on the last leg of the journey, past the Kurile Islands, I had the bright idea of shipping this whale vertebra back to George Goddard when the airplane returned, packed in a huge cardboard box out of which we had consumed all the C rations on the trip. With a large crayon, I had chalked on the box: "Dear George: If I had had half the spine of this whale, I wouldn't be where I am right now. Amrom."

I remember giving many speeches before the American Society of Photogrammetry, and there is one which I will never forget to my dying day. As is evidenced from this presentation, all my speeches are prepared on a crisis basis, and so it was with this speech to be delivered to the American Society of Photogrammetry at the Shoreham Hotel in Washington. (You see, my objective is not necessarily to give you the last word, but it is to give you the latest word.) Now, the day before I was supposed to go to Washington, I had my ticket, and some very rough notes which I intended to polish up in the roomette aboard the train to Washington. I had arranged to take a few hours off before train time, and I was really nicely relaxed and looking forward to a useful work session on the train.

What happens but that George Goddard decides to go to the Photogrammetry Society Meeting! I found this out by his question. He said: "Are you going to the Photogrammetric Society Meeting?" When I said, "Yes, I am " He said: "So am I. But there's no more space on the train." He added, "What space do you have?" I said I had a roomette (and I could dimly foresee what was about to happen),

He said: "Well, let's cancel it and get a double bedroom." My only possible answer to this response was, "Well, let's not cancel anything until you have your space."

Now I really thought I had him outplayed, because I had the ticket at home and I thought he certainly couldn't cancel my space without having my ticket. An hour later I found out, alas, that he not only could but did. Somehow he managed to get a double bedroom, and I was supposed to meet him at the railway station in Dayton. I went down there an hour early, not feeling very comfortable or relaxed at all, because I did not have the ticket. In matters of this kind, it is better to have the ticket and be independent of the less reliable member of the party. I got there an hour ahead of time and started looking for him. I didn't really start to get worried until ten minutes before train time when I set out on an intensive search of the premises - no Goddard. Pretty soon the old fog horn let loose: "Washington train coming in!" Still no Goddard! I heard the train thundering in - still no Goddard! Finally, in a desperate effort to find him, I found him in a phone booth making a long distance call. We tore upstairs and were ready to board the train when he says: "I left the tickets at home". By this time, I was one large bundle of nerves, so I said: "George let's get on the train. We'll solve the problem later. This is the only train to get there; I've got to give a paper in the morning. Let's go, man."

After looking through all the pockets in his military uniform, of course, he found the ticket. But, of course, also by this time I

was completely unnerved, unhinged, unable to work, unable to sleep. George never slept better.

Among veterans of The Photogrammetric Society's meetings there is a special fraternity that has been formed called "Looking for Goddard's Hat". He always seemed to lose his hat at the annual meetings at the Shoreham. Further, he never sent but one man to look for his hat; instead he would draft entire battalions, and most of the meeting time would be taken up with recognition signals being passed from one member of the battalion to another. These people would meet each other all over and say, "You, too? You're looking for the hat?"

But enough of that kind of thing. I remember his enthusiasm for his work most of all.

One night a few years ago, (George had long since retired from USAF and was then working for the Bulova R & D Laboratories) we had dinner together and then he came over to my house. Following a couple of after dinner drinks and some conversation, my wife said: "General Goddard, what are you up to these days?" With that question he got up in the twinkling of an eye, ran outside to his car, yanked open the trunk, extracted two huge suitcases, brought them in, opened them on the coffee table, and for the next two hours was busy showing off a whole set of new products, cameras, altimeters and intervalometers. He was busy taking these apart, demonstrating them, showing their advantages, and all the while, not realizing or caring, that my wife was hardly interested in these technicalities, and certainly was not in the market for any of these products.

George Goddard has this marvelous non-focused, spherical, symmetric enthusiasm.

Now everybody in the country has a collection of Goddard stories. Hopefully, some day these will all be brought together, and those that can be printed, will be.

Gail Borden, a friend of Goddard's of long standing, passed on to me a small set of his collection of Goddard stories, and because they are his stories and because he wrote them better than I could paraphrase them, I will read directly from Gail's letter:

"As most of you older people at the testimonial dinner well know, there are almost as many legends told about George Goddard as there have been of assorted heroes who survived the Trojan War. So, were I a Homer or Virgil, I would begin this with something like: 'Tell me, Muse, of that man, so ready at need, who wandered far and wide...', or, more simply, 'Arms and the Man I sing.' "

"Several of George's more colorful deeds of derring-do come instantly to mind. For example, there was that warm Virginia day in 1921 when Lt. Goddard was to fly films showing Billy Mitchell's sinking of the 'Ostfriesland' from Langley to Washington. About ready to take off in a DH-4, already over-loaded with a sergeant and cans and boxes of proof of aerial bombardment's abilities, Lt. Goddard was momentarily detained by General Mitchell's arrival. The General was lugging a large sack, which he managed to cram into the plane. "Goddard", he said, "this is a sack of oysters which I wish you would deliver to Senator Borah! The General walked away, the plane took off and proceeded on its tail-heavy journey, the

lieutenant wondering how a young officer was supposed to carry a sack of oysters through the Senate Office Building. But Goddard didn't have too long to wonder. Just short of the York River, the propeller stood still at stiff attention (Goddard still remembers reading the manufacturer's trademark, 'Hartzell', on the rigid propeller). Goddard made a dead-stick landing. It was discovered that nothing short of a new engine would enable them to fly to their destination. Farmers gathered to gawk at the wonderful aeroplane squatting in their fields--and time went on. Finally, the sergeant remembered. "Lieutenant", he said "those oysters ain't gonna last very long in this weather. What'll we do?" "Break out a hammer," said Goddard. And then and there, the oysters were opened and passed out among the onlookers. The film got to Washington by train but Goddard could never see Billy Mitchell without being a little conscience-stricken. "Poor old General Mitchell," he would say in later years, "I'll bet he went to his grave wondering why he didn't get a thank-you note from Senator Borah."

"Another 'between wars' bit of Goddardiana also involves oysters, hot weather and Langley Field. Goddard was aboard the B-17, piloted by Captain Elwood Quesada, which was one of the three 17's that were to attempt an intercept of the Italian liner, 'Roma', several hundred miles out of New York in order to prove the feasibility of aerial operations over water. In the camera station, along with Goddard was a famous commercial photographer (I believe it was Carl Mydans of 'Life') completely clothed with Leicas, Contaxes, etc.

The B-17's went through some weather which Goddard still recalls as about the worst he ever encountered in some forty years of flying. And the guest photographer began to turn a shade of green. When the intercept was made, Goddard took the Air Corps pictures and those for the magazine as well. His colleague was holding it but that was about all he was able to do. When the mission returned, going through the same rough front again, it landed at Langley, the guest photographer barely able to sit upright. Goddard looked at him and asked, "How would you like a nice dish of cold fried oysters?" Goddard's coveralls and the mid-compartment of the B-17 were not the same for days.

"Over the years, from lieutenant to General, Goddard has been the target of dat ole debbil, 'higher authority'. He was seized by a security-mad guard for taking pictures of Marines playing volleyball on Bikini just before the big blast; he was taken into custody by one of General Patton's MP's for riding 'five men in a jeep', he got in hot water twice with General Brett: once for coming too close to planes in an Air Corps review over Chicago (he had to get a GOOD picture), and again for 'monopolizing' President Roosevelt's inspection of Wright Field (F.D.R. became more interested in pictures of the Grand Canyon and Hyde Park than of all the other exhibits at Wright Field) with the result that he gave Goddard's photo show most of his allotted 'inspection' time. He also gave General Brett the highest blood-pressure he had had since George took shots of his big review.

"But, on a more serious note, there was the time when Goddard wanted a photographic trailer with a certain width track. This, he discovered, couldn't be had. All army vehicles had to have a track of specified width. Never one to say 'die', especially when there seemed to be no reason for the official ukase, George looked into the matter. He discovered that the official trackwidth of Army carriers had been ordained by some 'higher authority' in the 19th century, and that it was based on the width of railroad tracks in this country which, in turn, had been taken from the British gauge, which, in turn, had stemmed from Stephenson's first locomotive which, again in turn, had been run over tracks laid on old Roman roads. And these, of course, had been ordered by Julius Caesar to the track of chariot wheels; and for Julius, this was two paces of a Roman legionnaire. Well, Goddard changed this history--as any photo trailer type can tell you.

"And now one final yarn. George Goddard is as brave a man as I have ever known. He has had the bottoms blown out of planes by his flash-bombs, he has scurried through Europe within sight and hearing of enemy artillery, he has endured a number of blitzes in England, and he has flown as co-pilot across the Irish sea with Elliott Roosevelt. But, like all brave men, he has some phobias. There are brave men who can't abide snakes, others who fear being locked in a bank vault, and so on. As the missile-age came into being, George found that he could take the regular stuff: HE, incendiaries, etc., and anti-aircraft fire and rockets, but those V-1's were a little sneaky. At the time of their arrival in London,

Goddard was situated in an elegant room, overlooking Hyde Park, on the top floor of the Cumberland Hotel. The V-1's didn't bother him too much until some Ordnance expert described the last, long glide of this weapon, pointing out that as it sliced downward, its stubby wings caused it to hit at an angle and that the most dangerous place to be was high up in a building.

"George immediately contacted the manager of the Cumberland after this learned interview and obtained for himself a small, dark room on the lowest floor--one that overlooked the drab uncertainty of a dark English courtyard. The manager was mortified that an Air Corps Colonel should be so housed, but Goddard lived there happily until one day he was asked to go out to Chiswick and take pictures of a large hole in the street. The cause of this hole, it developed, was the first V-2 to hit England. When Goddard discussed the V-2 with his scientific Ordnance friend, he was told the ballistic characteristics of this daddy of the ICBM. "It comes straight down", said Goddard's advisor. George again contacted the Cumberland's manager and moved into his old diggings high up and overlooking the Park.

"He lived happily thereafter until his invasion of France, which was second only in magnitude to Eisenhower's. But that's another story."

But anecdotes only illuminate a career, they do not define it. I cannot leave this audience with anecdotes only, useful as they are and as much fun to tell. Let us now look more formally at George Goddard's career.



General George W. Goddard, pioneer, experimenter, and protagonist in aerial photography for 44 years. How sum the man and measure his work, see his mark? Will the simple chronology of a career, the stark and sterile dates and places - names tell his story? Look:

With the start of World War I, General George W. Goddard enlisted as a private in the Aviation Section of the Signal Corps. In December 1917, he was sent to the first Officer's School in Aerial Photography, United States School of Military Aeronautics, Cornell University. Upon graduation, he became instructor in aerial photographic interpretation.

Commissioned as a Second Lieutenant in August 1918, he left for Taliaferro Field, Fort Worth, Texas, to organize and take to France the 43rd, 44th, and 45th Aerial Photographic Sections. With declaration of the armistice, these plans were cancelled. He was then ordered to Carlstrom Field, Florida, where he completed his pilot's course, receiving a rating of airplane pilot.

Assigned to McCook Field, Dayton, Ohio, in May 1919, as Officer in Charge of Aerial Photographic Research, he initiated developments in infrared and long-range photography; special aerial cameras; photographic aircraft; and portable field laboratory equipment. Here, then, was formed the nucleus of the present Photo Reconnaissance Laboratory at Wright-Patterson Air Force Base.

In 1920, he was promoted to First Lieutenant and assigned as Officer in Charge of Aerial Photography to the Office of the Chief of the Air Corps, Washington, D. C., replacing Colonel Edward J. Steichen who had resigned to resume photographic work in civilian life.

While on this assignment, he received a presidential appointment as Air Service Representative on the Federal Board of Surveys and Maps. He organized the first Army Aerial Photographic Mapping Units which pioneered in the mapping of Muscle Shoals, Tennessee River Base, Teapot Dome, Mississippi River, and many other areas. Such work pointed the way for the now extensive Civilian Mapping Industry.

In 1924, he was again assigned to McCook Field as Officer in Charge of Aerial Photographic Research. Continuing the research he had started, he also led the way in the development of night and long-range photography. In 1926, he invented special shutter and flash synchronizing equipment which was used to take the world's first aerial night photograph. Among other developments were quick processing of film and prints in airplanes during flight, wire picture transmission of military air photographs, and new type cameras.

Ordered to the Philippine Islands and assigned as Commanding Officer of the 6th Photographic Section, Camp Nichols, P. I., in 1927, he mapped many unexplored regions of the Philippine Islands for General Douglas MacArthur, the U. S. Coast & Geodetic Survey and the Corps of Engineers.

In 1929 he was assigned as Director of the Army Photographic School at Chanute Field, Rantoul, Illinois. In 1934, he was promoted to Captain and ordered on temporary duty to Fairbanks, Alaska, to supervise the aerial mapping operations in central and northern Alaska. Under his direction, five aircraft, flying at altitudes of 16,000 feet and spaced eight miles apart, photographed 35,000 square

miles of territory in seven hours and forty-five minutes--setting a new record in photographic mapping.

In 1936, he was assigned Chief Photographic Officer in Charge of Aerial Photographic Research, Wright Field, Dayton, Ohio. In this capacity, he carried on the vital work begun so much earlier at McCook Field, pioneered in the field of color, high altitude, and stereoscopic photography; and set up the organization which was to play such an important part in World War II. Shortly before the U. S. entered the war, General Goddard, then a Lieutenant Colonel, flew to England to act as special observer with the R.A.F. Upon his return to the United States, he did much to promote faster photographic aircraft for our use in case we should enter the war. It was during this year that he was promoted to the rank of Colonel.

In 1943, he was assigned liaison duties in Washington with the Chief of the Bureau of Aeronautics. During this period he did much to interest the Navy in the use of the continuous strip camera and in color photography, which played such a large part in the Navy's aerial reconnaissance in the Pacific. In 1944, he was awarded the Legion of Merit for his work as Chief, Photographic Laboratory, Wright Field.

Later in 1944, he went on duty with ETOUSA in England and the continent. During this period he introduced the moving film magazine for use in day and night photography, and assisted in the modification of the Mosquito for night radar reconnaissance.

Following V-E Day, he was appointed Photographic Disarmament Officer and visited many German photographic industries, studying their

cameras and equipment. Much of his time was spent in the Zeiss plant in Jena, where, in June of 1945, he turned the plant over to the Russians when they took over Thuringia. Of course, as one should suspect, the major group of Zeiss designers and engineers left for what is now West Germany. But that's a separate story. For his service during this tour of duty, he was presented with the Oak Leaf Cluster for the Legion of Merit.

Following his return to the United States, in late 1945, as Chief of Research and Development, Photo Reconnaissance Laboratory, Weapons Components Division, Wright Air Development Center, General Goddard was sent to Bikini in connection with the 1946 A-Bomb tests.

In July 1950, General Goddard received the Thurman H. Bane Award for 1950 "for the outstanding Air Force development of the year". This award was made for the development of the low altitude high-speed night photography system using small flash cartridges ejected from the aircraft and synchronized with the camera system. This system was rushed to Korea at the beginning of that campaign and did good work in night reconnaissance.

Immediately after receiving the Bane Award, General Goddard was ordered to Korea to study Far East Air Force reconnaissance problems and requirements.

On the 20th of August 1951, General Goddard received the Honorary Degree of Master of Photography from the Photographer's Association of America, during their annual convention in Milwaukee, Wisconsin.

The Progress Medal Award of the Photographic Society of

America was awarded to Colonel Goddard on October 10, 1951, at the annual society convention in Detroit.

With well over 6,000 flying hours, Colonel Goddard is rated a Command Pilot and Technical Observer. He is entitled to wear the Legion of Merit with the Oak Leaf Cluster, American Defense Service Ribbon, the EAME Theatre Ribbon and medal, and the French Croix de Guerre, which was awarded him by the French Government for his work in Paris in the organization of the French Aerial Photographic Research and Operational Units.

Is this then the story--dates, assignments, awards? Certainly not the whole story. When proper historical perspective is achieved, it will become clear that General Goddard's major technical achievements can be summarized in a phrase--the increase of the performance capability of airborne photographic reconnaissance.

The most important factors which the aerial photographer must combat to secure good photographs are distance, speed, and lack of illumination--and it is in these three broad problem areas that General Goddard made his greatest and most lasting contributions.

First to recognize that higher quality and longer focus lenses were needed for high altitude and long range oblique photography, he early took action to stimulate lens design and construction in this country as it had never been stimulated before. Taking up (just prior to World War II) the then unpopular cause of long focal length lenses, General Goddard next made a long shot bet on a then unknown 25 year old lens designer, Dr. James G. Baker of Harvard College Observatory. The two men laid down a program

of lens design and construction, starting in 1941, with a 40-inch lens and culminating in the recently completed Boston University 240-inch lens. This program, successful at every turn, captured for the U. S. and its Air Force the world's lead in lens design and construction, and produced the world's finest lenses--lenses which could - and did - photograph railroad ties from 40,000 feet, and which can yield excellent photographs of military value from distances of 20 to 60 miles. This achievement of producible quality lenses is of permanent and far-reaching importance to reconnaissance for all time.

Aircraft speed - and the consequent motion or blur imparted to the image during exposure has been a tough problem. A strong and consistent program of developing high speed shutters has been successful. But high speed shutters are not enough, for under adverse illumination conditions, they cannot be used. The principle of image-motion compensation - moving the film in synchronization with the speed of the image while the photograph is being taken - was developed and vigorously pushed by Colonel Goddard. It is now being applied to all standard cameras. Its most outstanding application to date is in the shutterless strip camera, which having no shutter at all, produces a long continuous (and sharp) photograph of the ground by wiping synchronized ground images on the film at the correct speed. This camera is especially useful under poor illumination and low altitude conditions. It has made exquisitely sharp photographs at 500 m.p.h. and 50 feet altitude. This principle of image motion compensation is undoubtedly one of the most significant advances in the history of aerial photography.

Night photography, now rightfully admitted to be an important, powerful, and key weapon in the reconnaissance structure, was started by General Goddard, as noted earlier, in the early 1920's. His pushing - against opposition and disinterest - of this tool, has resulted in improved night lenses, cameras, and illuminants, which now permit successful photography at altitudes of from several hundred feet to thirty thousand feet. Night photography is now a strategic reconnaissance tool of prime importance. No longer just a stunt, a trick, it is now standard in both tactical and strategic reconnaissance.

The unbounded energy, enthusiasm and vigor which has permeated his efforts has been enough to wear down the legs and lungs of youngsters half his age. For too long he was the solitary spokesman for reconnaissance and aerial photography - lecturing nights, week-ends, and noon hours to all who would listen. Whether to Boy Scouts, whom he could see as future Air Force officers - Kiwanis and Rotary - Army, Navy, and Air Force groups - whether visiting airmen or foreign delegations - all left General Goddard's talks and lectures with a new appreciation of aerial photographic reconnaissance and airpower. Perhaps all of these groups caught a glimpse of a dedicated man, who, they might have (correctly) suspected, lived, breathed, and dreamt of progress in this field. For to him his work and what he was doing was the most important thing in the world.

He paid the price. For him there was no career planning - no carefully calculated rounding of experience in all phases of airpower. The single-minded focus, yea - fanaticism - with which he kept his eye on the reconnaissance ball meant a career specialization

ordinarily fatal to promotions. When he could have - or perhaps should have - thought of the advancement that comes with operational commands, he was thinking of a newer and better camera, a longer focus lens, a new film.

Nor did the ideas and methods, now commonplace and acceptable to all in reconnaissance - night photography, faster shutters, better lenses, long-range photography, planes, films, color emulsions, and many others which enable reconnaissance to be accomplished by high speed aircraft at any operational altitude - rise easily and naturally to their rightful place. His major opponents - which Goddard fought fair and foul and long and loud - were indifference, apathy, limited vision, complacency and misunderstanding.

No better champion of the visionary and unwanted could be found. Night photography, long range cameras, to name but two of the important developments, were regarded by "practical" men as tricks, as unnecessary, and as useless. He fought illogic - and, it must be recognized -- ill-spirit. He won his fight, and must now fight only for standing room on the bandwagon so long in the building.

George, we salute you; as a pioneer, as an inventor, as an innovator, as a leader, as a catalyst -- who took money and people and ideas -- and bringing them into proximity, caused fission, fusion, and great progress.

We often hear about national purpose; at best it is not much more than a direction; it is without momentum, motion, power. Goddard had not only purpose, but also considerable thrust. Many of us, during our long association, thought that the continuous explosion



that surrounded him was spherical -- but this was because we could not see the direction. But, when it was all over, we found a tremendous residue of progress in the right direction. We are doing things higher, faster, under worse conditions in better ways than we ever did before.

George Goddard will not only be remembered for what he did, but for his alumni, many of us who are here right now--in industry, in military service, in government. We will remember him for his inspiration, for his devotion and for above all, for waging a good fight, with spirit with excitement, and above all, with style.